Planetary Landing Lidar, Phase I

Completed Technology Project (2018 - 2019)

Project Introduction

NASA and others are pursuing bold concepts of landing a scientific craft on the surface of planetary bodies to perform in-situ science. These mission concepts require extremely precise landing at pre-designated sites of high scientific interest while avoiding hazardous terrain that could adversely affect the lander operation. The Planetary Landing Lidar Sensor (PLLS) requires advancement in resolution, range, and processing rate in comparison to other landing/proximity lidars. Fibertek's technical approach is capable of meeting PLLS requirements for a range of mission requirements. Our innovative PLLS architecture incorporates the following state of the art technology:

1) Radiation hardened single photon, optimal efficiency light detection and high-precision analog-to-digital conversion.

2) Novel real-time processing algorithms implemented in readily space-qualifiable hardware, generating high resolution digital elevation maps in near-real time.

3) A apace-qualified laser transmitter laser system with inherently radiation hard components.

Anticipated Benefits

Compact 3D topology lidar as a precision entry, descent, and landing sensor for planetary/lunar/asteroid missions.

Rapid-scan and image processing for enhanced EDL sensor functionality.

High resolution topology lidar for proximity operations, satellite servicing and sample & return missions.

The laser system maturation provides a high reliability and low SWaP laser transmitter for in-situ Raman lidar instruments.

The DoD community is actively pursuing real time 3D lidar sensor technologies for intelligence, surveillance and recognizance applications on airborne and space borne platforms.

The sensor and processing technology is applicable to autonomous vehicle systems including self-driving cars.

The laser system maturation provides a high reliability and low SWaP laser for Raman lidar used for stand-off explosive detection.

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Small Business Innovation Research/Small Business Tech Transfer

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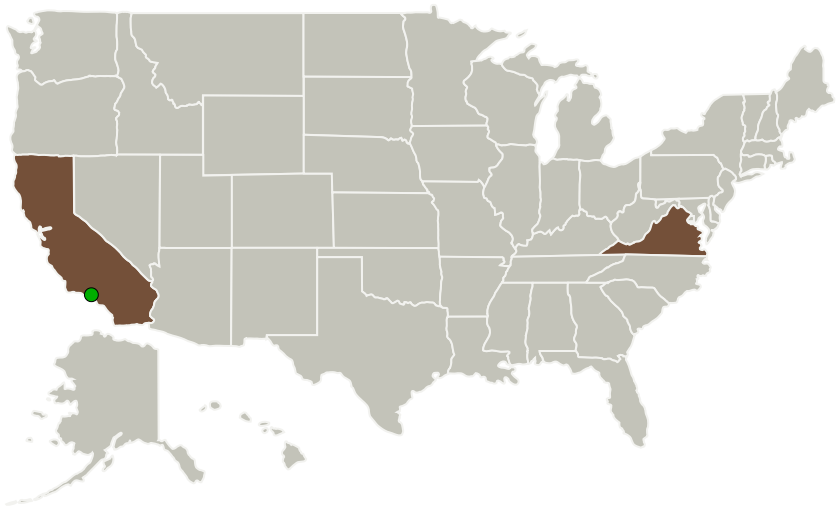
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Fibertek, Inc.	Lead Organization	Industry	Herndon, Virginia
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Virginia

Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/141227)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Fibertek, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

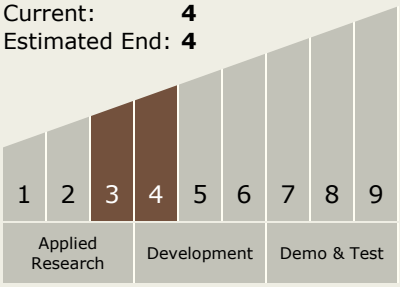
Carlos Torrez

Principal Investigator:

Michael Albert

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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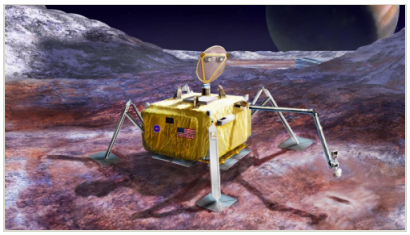
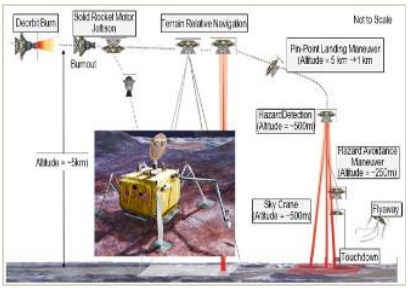
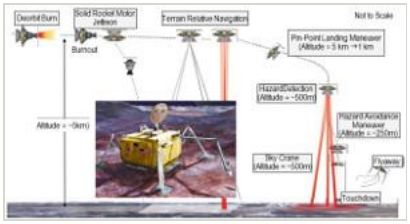
Images



Briefing Chart Image
Planetary Landing Lidar, Phase I
(https://techport.nasa.gov/image/131832)



Final Summary Chart Image
Planetary Landing Lidar, Phase I
(https://techport.nasa.gov/image/136483)



Final Summary Chart Image
Planetary Landing Lidar, Phase I
(https://techport.nasa.gov/image/130310)

Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.4 Vehicle Systems
    - TX09.4.4 Atmosphere and Surface Characterization

Target Destinations

The Moon, Mars, Others Inside the Solar System